



New Tools for Evaluating
Alpine Sensitivity & Water Quality
in the Upper Animas Watershed
San Juan County, Colorado

Submitted by
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Appendix B -REVIEW TEAM PROPOSAL CHECKLIST

Please CHECK the boxes for each component that your proposal meets and RETURN with your proposal

The purpose of the following checklist is to assist EPA in assuring all proposals are reviewed by the appropriate program experts and / or teams and is not intended to reflect priorities for funding. All proposals will be screened for eligibility under each of the grant programs described in the RFP and all eligible grant applications will be considered for funding. An EPA review panel will make the final determination regarding under which grant programs the project or separable components of a project may be considered.

- ☒ *I am willing to accept funding at a lower level than my request, or partial funding covering some project components, OR*
- ☐ *I am not willing to accept funding at a lower level than my request*

Geographic & Special Emphasis Areas:

- ☐ 1-70 Corridor (Golden to Glenwood Springs)
- ☐ Upper Missouri River Basin
- ☐ Yellowstone River Corridor, Montana
- ☐ Missouri Wild and Scenic/Recreational Rivers, Montana/South Dakota
- ☐ Big Sioux River Basin, South Dakota
- ☐ Missouri River Mainstem Garrison reach, North Dakota
- ☐ Missouri River Mainstem Fort Peck reach, Montana/North Dakota
- ☐ Red River/Devils Lake Basin, North Dakota/Minnesota
- ☐ Cherry Creek Watershed, Colorado
- ☐ State/Tribal Unified Watershed Assessment high-priority watershed
- ☐ Watershed Affected by CBM Development (Montana, Wyoming, Utah, Colorado)
- ☒ Assessment or monitoring
- ☒ Volunteer Monitoring

Water Program:

- ☐ Pretreatment
- ☐ Biosolids
- ☐ Wet Weather (e.g. storm water, sanitary sewer overflows)
- ☐ Concentrated Animal Feeding Operations
- ☐ Wastewater
- ☐ Coal Bed Methane
- ☒ Mining
- ☒ Reduction, Prevention, or Elimination of Pollutants in Surface Water

Wetland Program areas:

- ☒ Project directly related to wetlands protection or assessment.

TMDL Development:

- ☒ End product is an assessment or monitoring information related to a 303(d) listed waterbody for the development of a TMDL
- ☐ End product is an assessment of a 303(d) listed waterbody
- ☐ End product is a TMDL for a 303(d) listed waterbody
- ☐ End product is implementation of a TMDL

Regional Geographic Initiative

- ☒ Addresses Geographic and / or Special Emphasis areas listed above
- ☒ Addresses environmental issues on a landscape scale using a multi-media or multi-program approach
- ☒ Leverages resources from and builds relationships in a variety of programs and agencies aimed towards environmental results
- ☒ Creates a strategy/plan for focusing resources and community approaches to environmental problem solving

Executive Summary

New Tools for Evaluating Alpine Sensitivity & Water Quality in the Upper Animas Watershed San Juan County, CO

Hydrological Unit Code: 14080104

Latitude & Longitude: 37° 48' 43" N, 107° 39' 50" W

Watershed: Animas

Environmental Setting/Problems

San Juan County, CO (SJC) was at the center of the metal mining boom in the San Juan Mountains late in the 19th century. Although most mining activity ceased by the 1940s (some activity occurred as recently as the 1990s), the legacy of that activity lives on in colorful historical buildings as well as the effects of the metals in both surface and ground water through historical mining practices. These metals also occur in the water through natural processes. Metals in both surface and ground water can exceed EPA Clean Drinking Water Standards. In addition, the upper Animas watershed is experiencing pressure from recreational users and potential development. Identification and the mapping of sensitive areas would be a useful tool for resource management, preservation, and land use planning purposes. Since much of the private property in SJC takes the form of mining claims, often requests for development relate to these mining claims. However, reasonably accurate maps of these properties are non-existent. Such mapping will also aid in identifying public vs. private land for recreational users on the Alpine Loop (a scenic system of 4WD and other roads in the mountains north of Silverton). Currently, San Juan County officials must deal with protecting water quality and human health without the benefit of more accurate private property boundary maps, relevant scientific information or adequate tools.

Major Goals

The primary goal of this project is to take both existing and newly created data relating to water quality and to create an integrated user-friendly set of tools to be utilized by the San Juan County Board of County Commissioners (BOCC), Planning Commissioners and Assessor in making scientifically-based land use decisions—specifically as relates to effects on water quality and human health issues.

Project Summary

Although a great deal of water quality research has been done in the Animas watershed, the data collected has never been assembled into a package that is useful for land use planners. This project will focus on key areas in the Upper Animas Watershed to 1) review and re-organize relevant existing water quality data and information in order to identify human health risks relating to domestic and drinking water, 2) identify sensitive alpine areas including wetlands and 3) improve upon the accuracy of existing mining claim maps. From this information, an integrated package will be developed for use by the BOCC, Planning Commissioners, County Planner, Assessor, landowners and other agencies. Finally, County officials will be trained in the use of this information as an aid to making informed land use decisions.

Funds Requested: \$91,685

Matching/Leveraged Funds

Cash match is from the BLM for the more accurate mapping of mining claims (\$12,000) and from San Juan County (\$2000). In-kind match is in the form of office space (San Juan County, \$4200 and Fort Lewis College, \$2400), proposal development and project planning by MSI staff (\$6100), lab analysis services from University of Colorado (\$8000) and Dr. Mark Williams' salary for supervising the alpine sensitivity study (\$4200). Also, in Bill Simon's fee there is a \$7770 in-kind match.

Cash Match: \$14,000

In-Kind Match: \$32,670

PROPOSAL

Environmental Problem Description

San Juan County, CO was at the center of the metal mining boom in the San Juan Mountains late in the 19th century. Although most mining activity ceased by the 1940s (some activity occurred as recently as the 1990s), the legacy of that activity lives on in colorful historical buildings as well as the effects of the metals in both surface and ground water through historical mining practices. These metals also occur in the water through natural processes. Metals in both surface and ground water can exceed EPA Clean Drinking Water Standards. In addition, the upper Animas watershed is experiencing pressure from recreational users and potential development. Little is known about what areas are most sensitive to these pressures, perturbations and the subsequent effects on water quality. Since much of the private property in SJC takes the form of mining claims, often requests for development relate to these mining claims. However, reasonably accurate maps of these properties are non-existent. Such mapping will also aid in identifying public vs. private land for recreational users on the Alpine Loop (a scenic system of 4WD and other roads in the mountains north of Silverton).

Project Goals

The overall goal of the project is to provide SJC officials scientifically-based tools for making smart growth decisions and to improve land use planning. This information will also benefit other land managers, such as the BLM, in carrying out their public land management responsibilities. These tools relate specifically to making decisions based on alpine sensitivity to perturbations, drinking water quality, and the potential effects of development and recreational use on water quality, e.g., where drinking water is likely to be unsafe, the effects of septic systems on hydrological flowpaths, the effects of roads and landscaping on the water supply or the effects of recreational use, etc. Currently, San Juan County officials and public land managers must deal with these issues without the benefit of relevant scientifically-based information and tools. "Water is a community asset that is critical to public health, economic stability, environmental quality, and quality of life. Sustainable communities protect their watersheds and conserve wetlands, flood plains, and other aquatic resources."¹ Much water quality data exists, but it is not in a form that is useful to them. Three main components will be created to achieve this goal: 1) hydrogeomorphic identification of sensitive alpine areas to include wetlands, 2) mapping of existing and potential drinking and domestic water supplies and 3) more accurate mapping of mining claim properties. The outputs from these components will be combined in an integrated package (maps, tables, reports & GIS coverage) that will provide SJC officials scientifically-based tools to be used in making smart growth decisions.

Project Description

Background & Partners

The Mountain Studies Institute (MSI), the submitting organization for this proposal, is a not-for-profit mountain research and education organization established in 2002 in Silverton, Colorado. In discussions with SJC officials it was agreed that MSI would seek funding for and coordinate a project that would be similar in focus to the alpine sensitivity study conducted in San Miguel County (SMC) in 1996-98. Initial thinking on the project was to build on the work done in SMC to enhance regional understanding of high alpine catchment areas. The SJC proposal is designed to fit the unique geologic and hydrologic characteristics of SJC utilizing a variety of EPA funds as well as BLM and other local matching funds. The SMC study was conducted by geographer Dr. Mark Williams (of University of Colorado and the Institute of Arctic and Alpine Research - INSTAAR) with EPA RGI grant support. Dr. Williams study focused primarily on identifying sensitive alpine regions to perturbations and the potential effects on water quality. Even though there are similarities in SJC and SMC, the SJC proposal will expand the scope of the SMC study to include domestic and drinking water quality, evaluation of riparian areas (including the rare iron fens located in SJC). These data will then be utilized to create hard-copy tools and assembled into a GIS for use by SJC officials. There is still some planning work to be done to locate specific areas of study, i.e., to identify sensitive alpine regions, priority areas for domestic/drinking water studies and riparian areas. Partner planning meetings will be scheduled as well as open public forums to seek public input into the project (see Task 1 below).

Dr. Williams has agreed to conduct an alpine sensitivity study which will include wetlands mapping as a part of this proposal (see Task 2 below). MSI will also be collaborating with the Animas River Stakeholders Group (ARSG), an organization that has been doing water quality studies in the Animas watershed since 1989. Utilizing existing

¹ Smart Growth Strategies: Protecting Water Resources, Local Government Roles and Options for the Rocky Mountains and Northern Great Plains (December 2001), National Association of Counties.

historical and current data from ARSG Bill Simon, ASRG watershed coordinator and owner of Alpine Environmental Services (AES), will work on the component of the project that examines the quality of domestic and drinking water including mapping of 28 newly adopted TMDLs (Task 3 & 4 below). These data will also be utilized, where appropriate, to complement the water quality data being gathered by Dr. Williams in the alpine sensitivity study.

Another related component of this proposal stems from an identified need by SJC officials for more accurate mapping of private mining claims in key areas. When a request for development is received, if officials know (based on the use of the above described tools) that an area is potentially problematic because of potential threats to the water supply or because the water supply is hazardous to human health at that location, it is important for SJC officials and landowners to have access to reasonably accurate property maps that correlate to identified sensitive or non-potable areas.

The Bureau of Land Management (BLM) has recently agreed to a mapping project of private properties along the Alpine Loop, part of which extends into SJC. This mapping complements a larger mapping project, the San Juan Skyway Heritage Project, being conducted by the Office of Community Services at Fort Lewis College and partner counties along the San Juan Skyway. Their objective is to map private lands along the San Juan Skyway in order to identify properties with high resource values (biological, scenic, historic, etc.) at high risk of development. These sensitive properties will then be evaluated by local county planning commissions and boards of commissioners for management strategies that are acceptable to their individual communities.

This work also complements and extends the scope of work that has been successfully conducted by the Red Mountain Task Force on Red Mountain (RMTF) pass and surrounding areas. The Red Mountain Task Force has worked with property owners willing to sell their property at appraised value. To date, 3152 acres have been purchased by the Trust for Public Land and transferred to the Uncompahgre National Forest and Ouray County. An additional 2,500 acres are under options to purchase.

This mapping of the SJC portion of the Alpine Loop adds a key component to the SJC proposal, helping to tie water quality and alpine sensitivity data more precisely to private lands. The SJC method is discussed in more detail below (see Task 5 below).

Finally, the products from the above tasks will be integrated and made available to SJC officials and others along with instruction in the use of these tools. These data will also be assembled into a GIS to be made available through ArcIMS server technology that will allow access through a standard web browser (see Task 6 below).

To summarize: this proposal seeks to 1) identify alpine regions in the upper Animas that are sensitive to various perturbations (Task 2 below), 2) provide organized data relating to domestic and drinking water (Task 3 & 4 below), 3) create more accurate mapping of mining claims, especially in key development-prone areas (Task 5 below) and make these data available in hard copy (map plots, tables, explanations and final report) and GIS format via the world-wide web (Task 6 below).

Task 1: Planning and Public Education

As noted above, a strong coalition of partners (MSI, San Juan County, Animas River Stakeholders Group, University of Colorado - INSTAAR, Fort Lewis College - Office of Community Services, Red Mountain Task Force, BLM, Southwest Data Center, et al.) has been assembled to accomplish the goals of this project. Partners have been working collaboratively over the past several months to develop this proposal, however, additional planning time is required to refine study priority areas and methodology among the partners.

Objective 1: During the grant period, MSI will coordinate and convene 3-5 meetings of the general public, project partners, and others to be determined (including Peggy Lyon with the CO Natural Heritage Program who has just concluded field work and a biological assessment in SJC; and Kathryn Ortega, Fort Lewis College faculty who works with students on Animas River riparian area research and education).

Completion of planning for this project: Month 1-3

Estimated Time: 50

Objective 2: EPA funds will enable MSI to coordinate project volunteers, and ensure development and dissemination of proposal products into user-friendly “Know Your Watershed” public education tools. MSI will

recruit volunteers and a summer intern from Fort Lewis to assist with M. Williams and B. Simon data collection efforts. Public forums and production of varied watershed maps (tailored for use by SJC officials, mountain recreational users, K-12 teachers, et al.) is planned.

Completion of planning for this project: Month 6

Estimated Time: 110 hours

Objective 3: MSI and Bill Simon will inventory and select an appropriate base map(s) and attributes for the development of a multilayered GIS. The objective is to provide resource, usefulness and cost information for the initial project planning sessions of all potentially usable base maps and attributes for GIS development, and to determine where additional data needs to be collected. Tasks include assembling and evaluating available maps and attributes from several agencies including San Juan County, Bureau of Reclamation, US Forest Service, BLM, USGS, and ARSG.

Completion of planning for this project: Month 1-3

Estimated Time: 20 hours

Objective 5: MSI is also requesting funds to initiate planning of a long-term, broad-range ecological assessment involving the entire San Juan Mountain region, referencing EPA's-supported Southern Appalachian Ecoregional Assessment work as a model. Since September, 2002, MSI has held preliminary conversations with EPA staff about MSI serving in the capacity of regional facilitator to an assessment process, to convene and coordinate issue identification and action-oriented efforts among local government, non-profit, and natural resource and environmental agency stakeholders in fourteen San Juan Mountain regional counties.

Regional planning activities would begin to identify, prioritize and develop a plan of action to address regional ecosystem (environmental and economic) needs. MSI's Inaugural Conference, "A Mountain Summit: Communities, Culture, Conservation," held in September, 2002, and attended by EPA staff, initiated this process and generated from 70+ regional participants seven topic areas prioritized from high to low. While most topic areas groups rated their topics from high to low, water quality and quantity issues were consistently rated high only. Similarly, conference evaluation respondents indicated that growth, land-use planning, and sustainable economic development were of paramount concern regionally. EPA funds would enable MSI to expand upon this past planning exercise by hiring a part-year regional organizer to conduct outreach and coordinate MSI's annual forum. This forum, tentatively scheduled to be held in August 2003, would serve as the kick-off to this eco-regional planning process with representatives participating from across the 14-county region. MSI plans to solicit additional funds for this longer term planning process from the Forest Service/BLM, USGS, and other government agencies .

Completion of planning for broader project: Month 9

Estimated Time: 330 hours

Task 2: Hydrogeomorphic Identification of Sensitive Alpine Regions

This task will develop planning tools for high-elevation catchments in San Juan County (SJC). The evaluation will be based on the Hydrogeomorphic (HGM) approach recently outlined by the US Army Corps of Engineers in the Federal Register (Vol 61, No 160, August 16, 1996) and adapted by Williams et al. (Mtn Res and Devel, V 21, 71-78, 2001, see attachments) for San Miguel County. For each basin selected by SJC, landscape type will be mapped and assigned hydrogeomorphic attributes based on water quality and water isotope values. Please note that this proposal builds on previous efforts in nearby San Miguel County, for which M. Williams received an Environmental Achievement Award in 1999 from Region 8 of the EPA.

Dr. Williams (of INSTAAR) approach to landscape mapping is to draw polygons of landscape types on mapping material (e.g., topographic maps, aerial photos, etc) provided by SJC. The HGM attributes will be developed based in large part on water quality measurements associated with landscape type. These water quality measurements will provide information on sensitivity to perturbations such as:

- Building construction
- Septic tanks/leach fields
- Road construction
- Water development
- Activities associated with mining

Goals

The primary goal of this task is to provide information to SJC to identify and characterize high-elevation areas that are potentially sensitive to perturbations. Additional and complementary uses include information for protection of source-water and well-head protection areas. This information will aid SJC and other entities with developing land management strategies acceptable to SJC officials and citizens.

The primary data source for this evaluation will be mapping of landscape types in high elevation areas of SJC. The mapping program will be supplemented with measurements of water quality and water isotopes as detailed below. Other available data that may become available from complementary or prior research activities in and near SJC, will be included in the analysis, as outlined in Tasks 3, 4, and 5.

The sensitivity analysis will be conducted for three components. [1] Landscape Types. For each landscape type that is mapped, Dr. Williams will provide attribute information based on the HGM approach. In turn, this attribute data will be based on process-level information for each landscape type. [2] Sensitive Portions of Individual Watersheds. Dr. Williams will identify specific portions of individual watersheds that appear to be the most sensitive to perturbations. [3] Whole-basin Analysis. For each of the identified watersheds, Dr. Williams will provide a sensitivity analysis of the basin as a whole. This sensitivity analysis will be based on more than the sum of the component analytical tools, such as the inventory of landscape types and HGM attributes.

Objective 1: Landscape Mapping

The purposes of landscape mapping for SJC are to:

(i) provide an areal inventory of alpine landscape types for SJC, (ii) provide HGM attribute information associated with landscape type, (iii) provide the location of landscape types in each basin, and (iv) provide a scientific foundation on which to evaluate sensitivity of individual basins to perturbation.

The higher the resolution of the base map, the higher the resolution of the mapping.

The process of landscape mapping will be as follows:

- Inventory basins as determined by SJC.
- Draw polygons of landscape types from site visits in each of the basins on mapping materials provided by SJC, including topographic maps and aerial photos.
- Landscape types are defined in Inyan and Williams, 2001. These landscape types were developed for neighboring San Miguel County and hence should be appropriate for SJC, including talus, tundra, forest, riparian, wetland and exposed bedrock areas.

Completion: Month 4-6

Estimated Time: see budget section

Objective 2: Wetlands Identification

Special attention will be devoted to identifying and mapping wetland areas. Alpine areas have unique wetland attributes, including alpine fens and ice bogs. Wetland areas will be identified using the same criteria as Science Applications International Corporation (SAIC) used for wetland mapping in nearby San Miguel County and adapted by Inyan and Williams (2001). Thus, the mapping efforts will be compatible with EPA efforts to map wetland areas in San Miguel County. First, Dr. Williams will choose sub-basins to be mapped and wetland parameters to be used, then map wetlands, streams and open water as polygons. Finally, this mapping will be ground-truthed.

Completion: Month 4-6

Estimated Time: see budget section

Objective 3: Water Quality and Water Isotope Measurements

Water samples will be collected bi-weekly to monthly from approx June 1 through Aug 15 at three to five sites along the primary drainage identified by SJC. At least one water sample will be collected from each of the remaining drainages of interest. At least one water sample will be collected from each landscape type, with special emphasis placed on tundra, talus, meadow, and riparian areas. All water quality samples will be analyzed for the following parameters: pH, specific conductance, acid neutralizing capacity (ANC) or alkalinity using the Gran titration method (here assumed to equal bicarbonate), ammonium, Ca, Mg, Na, K, Cl, NO₃, SO₄, and PO₄. A subset of samples will also be analyzed for total nitrogen (TN), dissolved organic nitrogen (DON), particulate nitrogen (PN), total phosphorus (TP), and total organic phosphorus (TOP). Locations of sampling sites will be marked on maps and coded for reference. Water quality data will be presented in hardcopy and digital formats. ARSG water quality data will be used to complement and expand upon water quality conditions within these sub-basin units.

Dr. Williams will separate the stream flow into its baseflow or "pre-event water" and rain and snowpack runoff waters or "event water" using mixing models as conducted in previous work in nearby San Miguel County. Quality Assurance/Quality Control (QAPP) management plan for this project will follow guidelines established by the EPA for previous RGI grants received by M. Williams to conduct research on water quality in the San Juan Mountains of Colorado.

Objective 4: Sensitivity Analysis

The primary objective of the mapping and water quality measurements is to derive sensitivity maps for use in planning decisions. Sensitivity criteria will be developed in cooperation with the San Juan County Planning Department and through public forums. Initial results will be presented at a public forum hosted by the Planning Department. At that time, the public will be invited to comment on overarching themes for determining sensitivity criteria. A second public meeting will be held to present the results of the sensitivity analysis and mapping and to obtain public feedback on whether the sensitivity analysis is acceptable, in need of revision, or other action.

In nearby San Miguel County, sensitivity analysis was based on the public's desire to maintain high-elevation areas in a pristine condition. Two water quality variables were then used: (a) alkalinity (or buffering capacity) concentrations less than 50 ueq/L, and/or (b) nitrate concentrations greater than 8 ueq/L. Nitrate concentrations in surface waters are generally near or below detection limits of 0.5 ueq/L in pristine ecosystems. The reason for the low nitrate concentrations in surface waters is because terrestrial ecosystems are generally N-limited. This is why farmers add ammonium-nitrate and other fertilizers. Perturbations such as road construction, buildings, grazing, septic systems, and related activities short-circuit the nitrogen cycle through changes in hydrologic pathways and soil disturbance, resulting in increased output of nitrate to aquatic systems. The amount of nitrate in streams and rivers thus provides an index of the amount of current perturbation in the system and how that area may respond to future perturbations.

Residents of San Juan County will decide the rationale for determining sensitivity criteria. Most likely, residents of SJC will have a different overarching theme than nearby San Miguel County. Water quality and isotopic data will then be used in conjunction with the landscape mapping to develop sensitivity criteria and map sensitive areas. An important component of this sensitivity mapping is the incorporation of existing information on trace metal content and other water quality data (see Tasks 3, 4, and 5).

Completion: Month 4-6

Estimated Time: see budget section

Task 3: Mapping of Drinking & Domestic Water Quality

Much of San Juan County, and the sites with the highest potential for future development, lie within the San Juan Caldera, a volcanic feature that is enriched with metals. These metals have entered both surface and ground water through natural processes and historical mining practices. Metals in both surface and ground water do exceed EPA Clean Drinking Water Standards in certain areas and these need to be identified clearly. San Juan County and the San Juan Planning Commission have recognized a need to provide the public with available information concerning drinking water quality of streams, springs, and underground sources (wells). The Animas River Stakeholders Group (ARSG) and participating entities have been sampling water quality throughout the basin since 1989. This information currently resides in several databases with different formats. Well and surface water sampling has continued in several locations within the basin. The ARSG proposes to collect and validate these data and produce a format with site location maps that will specifically relate to drinking and domestic use water standards. The information will then be made available for easy use by planners and landowners.

Goal: Provide recent and historical human health-related water quality data and information in a user-friendly format for planning and development purposes.

Objective 1: Create a format, with attached site location map, of water well data.

(Probably about 30 to 40 sites only – includes monitoring wells)

Subtask 1: Gather data and load into a format of health related parameters.

Subtask 2: Map all data points

Estimated Time: 35 hours

Completion: Month 4

Objective 2: Create a format, with attached site location map, of water quality data of springs and seeps.

Subtask 3: Gather data and load into a format of health related parameters.

Subtask 4: Map all data points

Estimated Time: 40 hours

Completion: Month 5

Objective 3: Create a format, with attached site location map, of surface water quality data.

Subtask 5: Gather data and load into a format of health related parameters

Subtask 6: Map all data points

Estimated Time: 50 hours

Completion: Month 6

Objective 4: Create a format, with attached site location map, of draining mine water quality data.

Subtask 7: Gather data and load into a format of health related parameters

Subtask 8: Map all data points

Estimated Time: 35 hours

Completion: Month 7

Objective 5: Create a format recommended by Mark Williams and insert all existing nutrient related water quality data for the Animas Watershed.

Subtask 9: Gather all data and load into a format of nutrient related parameters

Estimated Time: 25 hours

Completion: Month 8

Equipment Needs: existing equipment will be utilized

Task 4: Provide map and tables of the State of Colorado water quality 303 (d) list of non-compliant streams and parameters

Objective: Create a strip map of streams with the 28 newly adopted Total Maximum Daily Loads (TMDL's), the points where compliance is to be met, and accompanying tables of the TMDL for each parameter for each segments.

Subtask 1: Use a base map to develop a strip map of non-compliant streams.

Subtask 2: Associate tables of non-compliant parameters and their TMDL's to the respective stream segment map.

Estimated Time: 20 hours

Completion: Month 8

Task 5: More Accurate Mapping of Private Mining Claims

SJC officials currently utilize outdated maps with a high degree of inaccuracy to identify mining claim properties. The information gathered from tasks 2 & 3 above (alpine sensitivity identification and mapping of drinking and domestic water sources) will be enhanced by the development of more accurate maps of private property—much of which is in the form of mining claims. These maps will help locate areas presenting human health problems and sensitive areas within the context of the private property in question. The accurate mapping of mining claims is rife with problems since most mining claim groups are tied to datum points that are not necessarily georeferenced to any coordinate systems commonly in use today. Short of extensive and extremely time consuming field surveys, techniques do exist for improving accuracy through the use of a mapping technique known as “rubber sheeting”. The BLM, in conjunction with the OCS, has recently agreed to fund a mapping project of the Alpine Loop region, part of which extends into San Juan County. This mapping work will be accomplished by a GIS contractor designated by the BLM through an RFP process. However, SJC proposal seeks to utilize an existing number of “control points” to enhance the accuracy of the rubber sheeting process in key portions of San Juan County such as Red Mountain Pass and the Animas corridor from Silverton up to Animas Forks (identified as high priority areas by county planners). The SJC proposal will work with Colorado Department of Transportation (CDOT), BLM, SJC Surveyor and the SJC Assessor to identify existing control points.

Goal: The goal of this task is to provide SJC BOCC and planners more accurate maps of private property and mining claims to help orient data from tasks 2 & 3, providing an integrated package for making informed land use decisions.

Objective 1: Identify control points in key areas and georeference them to UTM, coordinate system.

Completion: Month 5

Objective 2: Utilizing control points, “rubber sheet” existing maps to create digital GIS maps (compatible with other electronic deliverables) as well as print versions.

Completion: Month 6-7

Estimated Time: 160 hours

Task 6: Assembling data into hard copy & GIS format

Once the field data have been collected, existing water data is organized and formatted, and mapping of mining claims is completed from the tasks above, they will all be incorporated into an integrated package for SJC officials. This package will include map plots, tables, explanations and a final report in hard copy. In addition, this information will be assembled into a GIS. This work will be accomplished by the Southwest Data Center in Ridgway, CO (SWDC) and the Mountain Studies Institute. SWDC has been doing regional GIS projects relating to land use planning for the last 10 years and was involved in the San Miguel County Project with Dr. Williams. As a part of this proposal funds are also being requested to provide MSI with ArcIMS server capability. Once GIS applications are completed they will be served on the ArcIMS server which will make the coverages available to anyone with a standard web browser. This capability will also be used to publish other projects that MSI coordinates and facilitates in the future within the whole region as well as to publish existing orphaned data within the region.

Objective 1: Assemble all data into an integrated GIS.

Objective 2: Make this integrated GIS coverage available on the web through ArcIMS technology.

Estimated Time: 100 hours

Completion: Months 6-9

Equipment Needs: ArcIMS server and software

Outputs & Progress Reports

Task 1 Outputs – Project Partner and Public Forum Meeting Coordination, initiation of Eco-Regional Planning Process, development and dissemination of proposal products into user-friendly public education tools. 3-5 public forums and project partner meetings, and production of varied watershed maps is planned.

Task 2 Outputs – Maps outlining landscape type polygons with HGM attributes, water quality/quantity data, plus in-depth report detailing problems areas, criteria for making smart management decisions for SJC officials

Task 3 Outputs - Table, site location map, explanation and limitations for the three objectives outlined

Task 4 Outputs - a strip map of streams with the 28 newly adopted Total Daily Maximum Loads (TMDL's), the points where compliance is to be met, and accompanying tables of the TMDL for each parameter for each segments.

Task 5 Outputs: GIS Map coverage of mining claim properties in upper Animas watershed georeferenced based on identified control points

Task 6 Outputs - Integrated GIS coverage incorporating data from above stated tasks, map plots and web-enabled GIS application

A 5-page progress report will be submitted by November 15, 2003. It will include field data collection completed, the status of domestic water quality data organization, progress on GIS mapping and any adjustments to completion dates. A 20-page draft final report will be completed by January 31, with a final report to SJC, project partners and the EPA by March 31. The final report will summarize all work completed, analysis, conclusions and recommendations to SJC.

Milestones

April 15	Initial Planning Meeting, Silverton
June 1	Begin field work
July 1	Planning Meeting II, Silverton
Aug 8	A Mountain summit II - Ecoregional planning kick-off
Aug 15	End field work/Planning Meeting III
Oct 15	Turn in field maps to GIS contractor
Oct 31	Complete mapping of mining claims
Nov 1	End sample analysis
Nov 15	Submit 5-page progress report
Nov 30	Conference call to discuss progress report
Dec 31	Complete Integrated GIS application
Jan 30	20-page draft final report to San Juan County
Feb 28	Receive comments from San Juan County
March 15	Meet with San Juan County officials
March 30	Final report to San Juan County, project partners & EPA

Mountain Studies Institute - EPA Grant Proposal

Budget

Task	In-Kind Match	Cash Match	Water Quality Funds	Wetlands Funds	RGI Funds	Total EPA Funds	Total
Task 1 - Planning & Public Education							
Part-year regional organizer (330 hrs)					5000	5000	5000
Salary - Ellen Stein (60 hrs)	1500				1500	1500	3000
Publication of Educational Products (100 hrs)					2500	2500	2500
Base Map Inventory (20 hrs)	1100		550	550		1100	2200
Task 2 - Alpine Basin Sensitivity Analysis							
Salary & Fringes						0	0
Mark Williams (1/2 mo 100%)	4200					0	4200
Kim Raby 1 semester RA			8000	8000		16000	16000
Kim Raby Summer salary			2500	2500		5000	5000
Kim Raby 1 semester tuition remission			1250	1250		2500	2500
Bill Simon wetlands identification (185 hrs)	3885			10000		10000	13885
Travel (& summer lodging)			1000	1000		2000	2000
Other Costs						0	0
Supplies			1000	1000		2000	2000
Isotopic Analysis			2000	2000		4000	4000
Water Sample Analysis	8000					0	8000
Task 3 & 4 - Drinking Water Quality Analysis/TMDL M							
Salary						0	0
Bill Simon (est.185 hrs)	3885		5000	5000		10000	13885
Summer Intern				1000		1000	1000
Task 5 - Geospatial Mapping of Mining Claims							
GPS control points (est. 60 hrs)		2000				0	2000
GIS Mapping (est. 100 hrs)		10000				0	10000
Task 6 - Creating Integrated GIS & Web Hosting							
SWDC, (est.100 hrs)				2500	7500	10000	10000
SWDC, Map Plots					1000	1000	1000
Other Costs						0	0
ArcIMS Server Hardware		2000			6000	6000	8000
ArcIMS Server Software					2500	2500	2500
ArcIMS Server Training					1250	1250	1250
						0	0
MSI Office Space (Silverton & Fort Lewis College)	6600					0	6600
MSI Proposal Development	3500					0	3500
MSI Indirect (10%)			2130	3480	2725	8335	8335
Total	32670	14000	23430	38280	29975	91685	138355